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Chapter 5

Capital Stock and Investment Effects of the VAT-CIT Substitution

Standing virtually on a par with the alleged adverse international trade effects of the corporate income tax, examined in the following chapter, is the damping effect which the CIT is claimed to exert on economic growth through reduction in the rate of investment. Two views of this adverse investment effect have been advanced.

The first rests upon the relation of corporate liquidity to investment. With fixed or limited debt-equity ratios, the rate of net investment is constrained by the rate of growth of the equity base. The CIT enters this process by eroding one of the most important sources of nondebt finance: corporate retained earnings. A CIT reduction that was not fully shifted forward in the form of lower prices would result in an increase in after-tax corporate profits. Some fraction of this profit increase would presumably be translated into increased dividends, but the remainder, representing an increase in retained earnings, could be used to finance a net increase in corporate investment. And even if the CIT were shifted forward, the CIT reduction would increase the level of *real* net profits and hence investment because prices of capital goods would fall as a result of reductions and shifts of the CIT and of the simultaneous imposition of a consumption-type VAT which exempted capital goods purchases from tax. Thus, the liquidity theory of investment would predict an increase in the rate of investment in response to the VAT-CIT substitution, regardless of the degree of CIT shifting.

An alternative to this financial or cash-flow view of investment is the neoclassical theory of the determinants of real rates of investment [Hall and Jorgenson; Jorgenson and Siebert].

In the neoclassical theory, the process of investment determination is decomposed into two distinct phases: (1) determination of the *optimal capital stock* and (2) determination of the *rate of investment* over time by which the optimal capital stock is to be realized. In this context, the VAT-CIT substitution alters the rate of investment primarily through its effects on the optimal capital stock. Application of the CIT reduces the net rate of return to capital relative to the gross rate; this results in a reduction of the optimal capital stock. Therefore, reduction or repeal of the CIT would, ceteris paribus, raise the net rate of return to capital and hence increase the optimal capital stock.

The fundamental assumption of neoclassical theory is that the behavior of firms is profit-maximizing. Thus, the theory is applicable only to the case of zero CIT shifting, in which capital earnings in the short run represent quasi-rents. Application of the neoclassical model under the assumption of any degree of short-run forward shifting of a profits tax involves either assuming a highly elastic supply of foreign capital or the analysis of a farily complex and dynamic set of reactions if internal contradictions which would render the exercise of little value are to be avoided. Even in the classical case of zero CIT shifting the neoclassical theory relies upon assumptions concerning production functions which are much more rigorous than, and in formal contradiction to, those imposed by an input-output model.

Because of these incompatibilities between the neoclassical theory of investment and the model underlying our study of the VAT-CIT substitution, the analysis in this chapter of the investment effects of the tax substitution is limited to applications of the liquidity theory of investment. On the basis of previous analyses of investment behavior the effect of the VAT-CIT substitution on cumulative *gross* investment and short-term investment demand are assessed. These investment effects are projected first under the classical assumption of zero CIT shifting and then under the polar assumption of full forward shifting, assuming in both cases that the CIT is completely repealed. Estimates of the investment effects are developed for a selected set of individual manufacturing industries, for all manufacturing, and for all industries.

The liquidity theory of investment effectively explains real gross investment in the current period as a function of real cash flow in past periods. As originally formulated by Meyer and Glauber, whose

estimates by industry are most consistent with the present application, real gross investment in period $t(I_t)$, is determined by

$$I_t = a_0 + a_1 (T - V)_{t-1} + a_2 c_{t-1} + a_3 r_{t-3} + a_4 \Delta SP_{t-1} + a_5 I_{t-2}, \quad (5\text{-}1)$$

where T is real profit plus depreciation; V is real dividends; $T - V$ represents real *net* cash flow (net profit plus depreciation minus dividends); c is an index of capital utilization; r is a market interest rate; and SP is an index of stock prices. Because of the inclusion of lagged investment as a determinant of current investment, investment in the current period is a function of a stream of past cash flows. Thus, under the Meyer-Glauber formulation, an increase in cash flow in period t will then influence investment in periods $t + 1$, $t + 3$, $t + 5$, ... This cumulative (undiscounted) increment in gross investment demand resulting from a unit change in current cash flow is simply

$$\text{Cum } I = \sum_{s=1}^{\infty} \frac{\Delta I_{t+s}}{\Delta (T - V)_t} = \frac{a_1}{1 - a_5}, \quad (5\text{-}2)$$

where a_1 is the coefficient of net cash flow and a_5 is the coefficient of lagged investment in equation (5-1). Estimates of these coefficients have been derived by Meyer and Glauber for eleven manufacturing industries [p. 155].

To project the cumulative increase in gross investment due to an increase in cash flow it is necessary first to predict what fraction of that increase in cash flow would be siphoned off by higher dividends. The liquidity theory of investment does not itself explain corporate dividend behavior. To project the consequences of increased gross cash flows for the level of dividends we made use of Brittain's estimates of the determinants of corporate dividend behavior. In Brittain's analysis, dividends or, equivalently, retained earnings, are explained by the levels of profit and depreciation, and by the effect of the tax system on the desirability of capital gains relative to current dividend income. The basic dividend relationship proposed by Brittain is simply

$$D = b_0 + b_1 P + b_2 A + b_3 t_{25} P + (1 - b_4) D_{-1}, \quad (5\text{-}3)$$

Where D is the level of nominal dividend payments; P is nominal

net-of-tax profit; A is the nominal depreciation charge; and t_{25} is a "tax shelter" variable (marginal rate of personal income tax at the highest quartile of the distribution of dividend income, reflecting the relative desirability of capital gains over current income).

Equation (5-3) provides a basis for estimating dividends in *nominal* dollar terms. That is, a given change in *nominal* net-of-tax profit induces a change in *nominal* dividends. The change in real cash flow net of dividends is then the nominal change in net cash flow (change in net profit less change in dividends) deflated by a relevant price index. It is this change in real cash flow which serves to alter future investment behavior in the Meyer-Glauber model. For projecting investment behavior by industry the change induced in nominal net cash flow by tax substitution is deflated by an industry-specific index of investment goods prices. The index is obtained by applying interindustry capital flows as weights to tax-substitution-induced changes in individual capital goods prices.

5.1 INVESTMENT EFFECTS WITH ZERO SHIFTING

Under the classical assumption of zero CIT shifting, the supply schedule for capital goods will be unaffected by the tax substitution, though the effective price may rise as a result of increased demand for these goods, at least in the short run. However, if the CIT is repealed, after-tax profits increase by the full amount of original CIT liabilities. These initial CIT liabilities, or profit increases by industry, are presented in the first column of Table 5-1. Estimates of the change in dividends, based on Brittain's industry-specific estimates of the net profit-dividend relationship, are contained in the second column. The change in net cash flow (column 3) is simply the increase in profit less the increase in dividends. This represents the real net cash flow effect of the tax substitution, under the assumptions of CIT repeal, zero CIT shifting, and unchanged capital goods prices.

The *long-run investment effect* of this change in real net cash flow is then determined via the gross investment parameters estimated by Meyer and Glauber, again on an industry-specific basis. These investment effects represent undiscounted sums of the effects of the current-year increase in the net cash flow on investment in all future years.

For all manufacturing and for all industries these cumulative investment effects are approximately 1 1/3 times the increase in net cash flow. Compared to the original CIT liability, the cumulative

Table 5-1. Investment Effects of the Tax Substitution, Cash-Flow Approach; Assuming CIT Repeal and Zero CIT Shifting (dollars in millions)

Industry	*CIT Liability (= Profit Increase)* *(1)*	*Dividend Increase* *(2)*	*Increase in Real Net Corporate Cash Flow* *(3)*	*Cumulative Increase in Corporate Gross Investment* *(4)*	*Short-run Investment Effect* *(5)*
Food and tobacco	$ 1,727	$ 592	$ 1,135	$ 212	4.8%
Textiles and apparel	964	282	682	483	10.3
Paper and allied products	873	250	623	1,450	26.9
Chemicals	3,182	954	2,228	1,226	5.6
Petroleum and coal	692	207	485	638	3.1
Rubber	454	64	390	293	11.4
Stone, clay, and glass	630	190	440	543	9.2
Iron and steel	818	314	504	496	2.2
Nonferrous metals	257	99	158	530	7.3
Machinery, except electrical	2,446	939	1,507	2,263	22 6
Electrical machinery	2,182	838	1,344	2,753	8.6
Manufacturing	21,923	6,351	15,572	20,580	11.5
All industries	42,680	18,429	24,251	32,050	5.3

Notes:

Column 1: Estimated by Milton L. Godfrey of Cybermatics, Inc. See Appendix A.

Column 2: Estimation is based on Table 27 and equation (4-10), *Corporate Dividend Policy*, J. A. Brittain.

Column 3: Column 1 less Column 2.

Column 4: Estimation is based on [Meyer and Glauber, Table VII-5 and eq. (1), Table VII-2].

Column 5: Percent increase in gross investment is computed by means of (short-run) cash-flow elasticity indicated in [Meyer and Glauber, Table VII-6]. Cash flow = net profits less dividends plus depreciation.

increase in the investment activity of manufacturing industries is about equal to the CIT liability, while for all industry the investment effect is only about four-fifths the CIT liability. In both cases, however, the investment effects are certainly significant. As percentages of actual 1969 investment the tax-substitution-induced increases are 20 percent and 8 percent for manufacturing and for all industries, respectively. Recall, however, that these effects would in fact be distributed over future periods rather than being concentrated in the current period.

In fact, the persistence of these gross investment effects over the long term renders their interpretation somewhat difficult. The Meyer and Glauber short-run elasticities of investment with respect to net cash flow, which ignore the lagged investment effects, provide an alternative basis for projecting the investment stimulus of the tax substitution. The estimated short-run effects can be more directly interpreted as predictions of the initial consequences of the tax substitution.. Short-run percentage increases in gross investment, as presented in column 5 of Table 5-1, were obtained by multiplying the short-run cash flow elasticity (from Meyer and Glauber) by the percentage increase in real net cash flow prior to the tax substitution. In the short run, the repeal of the CIT, assuming zero CIT shifting, is estimated to increase investment by 12 percent in manufacturing and by 5 percent in all industries.

The investment stimulus of the tax substitution is observed to vary significantly over individual manufacturing industries. The cumulative investment expansion ranges from 20 percent to 350 percent of the increase in net cash flow (initial CIT liability less increase in dividends), with food and tobacco at the low end of the spectrum and nonferrous metals at the high end. Relative to the original CIT liabilities, the gross investment effects fall between 12 percent (food and tobacco) and 206 percent (nonferrous metals).

In terms of short-run investment elasticities a very different distribution of industries emerges. The estimated percentage increase in investment is only 2 percent in iron and steel and 3 percent in petroleum and coal, versus 23 percent in nonelectrical machinery and 27 percent in paper and allied products. In these short-run terms, nonferrous metals and food and tobacco, which represented the high and low cumulative investment extremes, are much closer, with 7 percent and 5 percent investment increases respectively.

These anticipated short-run investment responses are particularly significant when it is considered that they reflect only the first-year effects of the tax substitution. While further rounds of factor and output-market price adjustments would be expected to alter (prob-

ably erode) the very long-term effects of the substitution, the short-run responses can more realistically be interpreted as actual projections. The cumulative investment responses, on the other hand, must be interpreted primarily as indices of the degree of required future adjustment. However, the estimates of long-term, cumulative investment responses are uniquely interesting nonetheless. As the interindustry differences between cumulative and short-run effects indicate, those industries which are ultimately most significantly affected by the tax substitution are not necessarily those showing the most marked immediate responses. Those industries which, primarily for technological reasons, exhibit low short-run investment elasticities, may yet exhibit the most substantial longer term responses to the change in tax structure. Alternatively, equivalent short-run responses to the tax substitution need not imply that two industries will not be differentially affected by the tax substitution in the longer run.

5.2 INVESTMENT EFFECTS WITH FULL SHIFTING

For the polar case of full forward shifting of the CIT, the analysis is somewhat simpler. Obviously, nominal net cash flow is unaffected by the tax substitution since after-tax profits are unchanged, and dividends, in Brittain's analysis, are determined only by *nominal* net profit. Thus, the investment effects stem entirely from changes in capital goods prices and hence in *real* net cash flow, given the pre-tax-substitution level of *nominal* net cash flow. The unchanged nominal net cash flow is given in the first column of Table 5-2. The relative reduction in capital goods prices (column 2) differs very little over industries, ranging from 5.3 to 5.9 percent with a mean for manufacturing and for all industries of about 5.5 percent.

Given the increase in real net cash flow (column 3), the cumulative gross investment effect (column 4) is then obtained via equation (5-2). For manufacturing, the induced expansion of investment is about $2.7 billion or about 13 percent of the cumulative investment effect under the assumption of zero CIT shifting. However, the $9 billion all-industry effect is relatively greater, at about 30 percent of the zero-shifting stimulus, reflecting the greater importance of unincorporated enterprise in sectors other than manufacturing when full shifting, rather than zero shifting, is assumed. That is, under the latter assumption no investment stimulus was felt in the unincorporated sector, since only corporate cash flows were increased and capital goods prices were unaffected. However, under the as-

Table 5-2. Investment Effects of the Tax Substitution, Cash-Flow Approach, Assuming CIT Repeal and Full CIT Shifting (dollars in millions)

Industry	*Corporate Cash Flow (1)*	*Reduction in Price of Investment Goods (2)*	*Increase in Real Net Corporate Cash Flow (3)*	*Cumulative Increase in Corporate Gross Investment (4)*	*Cumulative Increase in Total Gross Investment (5)*	*Short-run Investment Effect (6)*
Food and tobacco	$ 3,819	5.95%	$ 242	$ 45	$ 57	1.3%
Textiles and apparel	1,614	5.42	93	66	68	1.5
Paper and allied products	1,917	5.32	108	251	251	4.7
Chemicals	4,614	5.81	284	156	160	0.7
Petroleum and coal	395	5.26	220	289	307	1.5
Rubber	946	5.72	57	43	43	1.7
Stone, clay, and glass	1,416	5.78	87	107	112	1.9
Iron and Steel	2,903	5.75	177	174	175	0.8
Nonferrous metals	915	5.60	54	182	182	2.5
Machinery except electrical	3,792	5.52	221	332	343	3.4
Electrical machinery	2,845	5.71	172	353	356	1.1
Manufacturing	33,995	5.50	1,979	2,615	2,672	1.5
All industries	73,627	5.45	4,244	5,609	8,980	1.5

Notes:

Column 1: Estimated by Milton L. Godfrey of Cybermatics, Inc.

Column 2: Estimation is based on Table 3-8 and 1969 capital flows as estimated by Milton L. Godfrey, Cybermatics, Inc.

Column 3: Column 1 subtracted from [column 1 ÷ (1 - column 2/100)].

Column 4: Same as for column 4, Table 5-1.

Column 5: Increase in total gross investment (corporate and noncorporate) as approximated by multiplying the increase in corporate gross investment by 1 plus the ratio between depreciation in the two sectors.

Column 6: Same as for column 5, Table 5-1.

sumption of full CIT shifting the source of the investment stimulus is identical in both incorporated and unincorporated sectors. In both sectors the investment expansion derives entirely from the tax-substitution-induced reductions in capital goods prices.

For all industries, the cumulative increase in gross investment ($9 billion) is more than twice the increase in real corporate cash flow ($4.2 billion) but only about 23 percent of original CIT liabilities ($42.7 billion). For manufacturing, the $2.7 billion cumulative investment effect is about 125 percent of the increase in real cash flow ($2 billion) but only 12 percent of initial CIT liabilities ($21.9 billion).

Individual manufacturing industries again exhibit wide variations, with a cumulative investment response of only 25 percent of the increase in real cash flow in food and tobacco versus an investment expansion in excess of 300 percent of the increased real cash flow in nonferrous metals. The mean cumulative investment effect for this selected group of industries is somewhat in excess of the manufacturing average of 125 percent of the cash flow increase.

The gross investment effects, computed as before from short-run elasticities (Meyer and Glauber), are closely grouped around 1.5 percent (manufacturing and all industries). Iron and steel is again relatively low (0.8 percent), although the lowest estimated increase is in chemicals (0.7 percent). The greatest short-run investment stimulus is observed in paper and allied products (4.7 percent).

Thus, under either extreme assumption for CIT shifting, investment would be significantly stimulated by the tax substitution. However, the investment expansion would be much greater, particularly in the short run, if the CIT were not shifted (a 5.3 percent increase in gross investment for all industry) than if the CIT were fully shifted (a 1.5 percent investment increase). In either event, the investment claims for the tax substitution are broadly substantiated, at least in the short run.